

gard to the huge blocks of dolomite in Tyrol (p. 548), and believes that these weighty masses have sunk down amid the yielding tuffs and sediments deposited upon their flanks. The reef problem is dealt with cautiously (p. 541, &c.), and the term "reef" is used, following Prof. Suess, as the equivalent of "massive unstratified limestones and dolomites," rising amid strikingly contrasted sediments. It is unfortunate that the latest evidence brought forward by Mrs. Ogilvie-Gordon as to the age of the igneous intrusions round Predazzo was published too recently to receive adequate notice in this volume, though her arguments and those of Rothpletz are briefly mentioned.

For those who desire a general history of the Alps, adorned with modern references, we may commend the whole seventh "Abschnitt" (pp. 589-610) as a clear and even spirited summary. The discussion of mountain-structure that follows shows the independence and vitality of the school which Suess has founded in Vienna, a school of progressive inquiry unhampered by dogmas, active in unearthing problems, but willing to wait for explanations.

Dr. V. Uhlig is given 260 pages for the exposition of the Karpathian lands, and occupies them with admirable clearness. Like his predecessor, he balances arguments, and states his own conclusions with the modesty of a true explorer. This is particularly noticeable (p. 904, &c.) in his account of the origin of the central *massif* of the Karpathians, which he regards as pushed up by pressure from all sides into and partly through its former Mesozoic covering. One-sided tangential movement will not, in his opinion, in any way satisfy the facts observed (p. 910).

The illustrations and sections accompanying Dr. Uhlig's descriptions are more than usually attractive. We see patches of Eocene conglomerate resting on the central granite of the Tatra, and crystalline schists, on the other hand, thrust up over Neocomian limestone at Bárát Lehotá, and sending off dyke-like tongues into the cracks opened in the latter. The fascinating question of the "Klippenzone," referred to by us in a previous review, receives full treatment. The beautiful landscape on p. 771 recalls many of the deep wooded valleys, among sheer limestone cones, which intersect the frontier lands of Arva. The tempting theory that the "Klippen" float as detached fault-blocks amid the softer Flysch deposits is set aside (pp. 791-4), in face of the banks of Upper Cretaceous conglomerate worn from them, and found so repeatedly against their flanks. Examples of these occur from the west end of the chain down to Transylvania (p. 809).

The great Flysch or Karpathian Sandstone series has yielded foraminifera in places, but is otherwise singularly devoid of organisms. Zuber has aptly compared it with the huge delta deposits of the Orinoco. Rock-salt and mineral oil characterise the Miocene horizons in Galicia, and Dr. Uhlig (p. 864) accepts an unconformity between these and the Karpathian Sandstone. He then shows how the present broken condition of the salt-beds may be due to post-Miocene earth-movements.

The important volcanic zone on the inner side of the mountain-ring raises again (p. 879) the question of the relations of the igneous rocks at Selmeczbánya. Prof. J. W. (not "C. W.") Judd is quoted, and the existence of a great central volcano is left as a possible solution. It is pleasant to find a photograph of the lofty obsidian cliff of Geletnek among others of this picturesque area. The rich ore-deposits of northern Hungary occupy cracks in the Miocene lavas, and are among the latest manifestations of the solfatara stage of the eruptions. While the Mesozoic rocks of the Karpathians were folded in early Eocene times, the volcanic outbreak can only be connected with the slighter post-Miocene movements, and appears to have accompanied the general sinking of the lowland.

We cannot do full justice, in concluding this notice, to Dr. Rudolf Hoernes's section on the plains. The Cainozoic history of the empire is involved in that of these great wind-swept level lands. We are taken from the basin of Vienna, which is really an area of depression formed within the body of the Alps, to the sandy reaches on the edge of the Government of Warsaw, where soil and vegetation have difficulty in clinging to the surface (p. 1049). The salt-beds of Wieliczka (p. 942) again come in for treatment, since the separate publication of the four divisions of the volume renders some overlapping unavoidable.

The ravine of the Danube east of Passau, already touched on picturesquely by Dr. F. E. Suess (p. 105), receives full discussion here after an interval of a thousand pages. Following Penck, the general conclusion is that the Danube flowed in pre-Glacial times over the detrital deposits of late Cainozoic age, cutting broad valleys in these, and ravines where it reached down to the underlying ancient rocks. The present prominence of the latter rocks is due to the denudation of the more yielding Cainozoic strata.

Of the four authors, Dr. F. E. Suess perhaps best realises the landscapes in his word-pictures; but the whole book has a literary value, and is thus all the more competent to stimulate observation and research. Its modernised spelling, such as "Zentralkern" and "Gneise," is perhaps a sign of its virility. The absence of an index will surely soon be rectified.

GRENVILLE A. J. COLE.

A NEW FRENCH TREATISE ON CHEMISTRY.

Traité de Chimie Minérale. Published under the direction of Henri Moissan, with many collaborators. Tome Premier—Métalloïdes; Tome Troisième—Métaux. Pp. xiii+527 and 672. (Paris: Masson et Cie., 1904.) Price 125 francs net.

THE recent advance in inorganic chemistry, to which M. Moissan has in no small degree contributed, has rendered it advisable, in his opinion and in that of his co-workers, to take stock, so that those engaged in research in that branch of chemistry may have in an accessible form an account of the whole field and a full bibliography of published memoirs. It is the laudable ambition of the editor to point out what gaps still remain unfilled, and where research may most profitably be undertaken. The atomic theory is

assumed as a basis of method, but in his preface M. Moissan says :—

“ Nous apportons, sur ce sujet, des idées éclectiques, et la raison, éclairée par l'expérience, sera toujours notre seul guide.”

The geological and mineralogical sources of substances are considered, but the details of physical and analytical chemistry are not touched. Industrial operations are sometimes chosen to illustrate chemical change, and, where thought desirable, the prices and tables of production of different countries are introduced. The work is primarily intended for those engaged in research, in industry, and in teaching. Among the thirty-two contributors may be mentioned the names of Charpy, Étard, Le Chatelier, Lemoine, Sabatier, and Vogt, besides many others of good reputation.

The introduction by the editor gives a historical sketch of the classification of the elements. In the present state of our knowledge of elementary bodies it is interesting to meet with the unprejudiced words of Lavoisier :—

“ If, by the word element, we mean the simple and indivisible molecules of which bodies are composed, it is probable that we do not know them; but if, on the other hand, we apply the name element or principle to the last term at which chemical analysis arrives, all substances which have not hitherto been decomposed are for us elements.”

The bearing of spectrum analysis on the question of the unity of matter is briefly touched on, and Moissan says that in his own high temperature work no sign of transmutation has ever been observed. He inclines, however, to the supposition of the unity of matter, and in alluding to the recent work connected with radio-activity, he believes that “ we are witnessing the dawn of inorganic chemistry, a subject not long ago regarded as exhausted.”

Various attempts at classification are next considered, but not even the periodic table is adopted. The reviewer cannot agree that the method followed presents any advantage whatever. The first family comprises hydrogen and helium, and the reason given for this curious collocation of elements is that helium is not well known! Carbon is separated from silicon, because the latter element forms no large number of “ organic ” compounds, and because the halides of silicon, like those of titanium and zirconium, are decomposed by water. While in most groups the element of lowest atomic weight is discussed first, cæsium begins the metals of the alkali group, because of its chemical activity; for the same reason the nitrogen group should begin with phosphorus. The final statement that the author thought it better to group the elements in accordance with their known properties rather than to give them to the reader in the disorder of alphabetical order seems hardly a happy way of determining which method of classification is the best, seeing that no particular properties are chosen, the criterion of resemblance sometimes being the appearance of the element, sometimes its melting-point, some-

times the stability of its salts in presence of water, and sometimes none of these, as where cobalt is placed in the same group as uranium, and lead and tin are separated from each other.

The result is, that without an index, which has not yet appeared in any one of the published parts, it is an almost hopeless task to find any desired compound. Gmelin's plan, perhaps, may serve as guide, that is, to find out the elements which have been treated of already, and to take the last in the formula of the compound as an index. But this leads to such an anomaly as having to look up bismuth thiocarbonate under “ carbon,” while potassium thiocarbonate comes under the heading “ potassium.” The amido-derivatives, too, are to be found after the salts from which they are prepared, and do not form a group by themselves, similar as they all are to each other.

Subject to these criticisms, however, the work is very complete, and is a most valuable compilation. It is unfortunately not free from omissions; for example, in discussing the determinations of the density of hydrogen, the work of Lord Rayleigh has been overlooked. Again, it is stated on the authority of Lunge (1879) that the greatest amount of chlorine in the world is made at the St. Rollox Works in Glasgow, a statement which is now unfortunately inaccurate. The spelling of proper names, also, leaves room for correction; Brareton-Baker, Tadeusz Estreicher, and Stass are among those which have caught the reviewer's eye. But, as before remarked, the index of literature is very large, and the number of facts given is greater than what is ordinarily to be found in a text-book, while the information is generally up to date, and these are advantages which cannot be overlooked.

ELECTRIC TRAMS.

Electric Traction. By J. H. Rider. Pp. xvi+453. (London: Whittaker and Co., 1903.)

THE name of the author and his position as chief electrical engineer to the London County Council Tramways are sufficient to recommend this book to anyone interested in electric traction. Nor do we think that anyone who takes it up in the hope of gleaningsome useful or suggestive information is likely to put it down with the slightest feeling of disappointment. The style is terse, but eminently readable; the opinions expressed by the author are often, no doubt, open to argument, but they have the great merit of conveying the impression that they are the opinions of a man who knows practically all that there is to be known about his subject, and who does not hesitate to state his own convictions, whether they are likely to be in agreement with those of other people or not. For example, we may refer to the little outburst of evident irritation at the need for the objectionable but compulsory guard-wires. These, the author holds, “ do not strike at the root of the matter, which is to prohibit entirely uninsulated wires of any kind crossing above the trolley wires.” Here speaks not the expert, but the tramway engineer; perhaps if fate had destined Mr. Rider to be a telegraph engineer, we